

US006601080B1

# (12) United States Patent

(10) Patent No.:

US 6,601,080 B1 Jul. 29, 2003

(54) HYBRID REPRESENTATION SCHEME FOR FACTOR L IN SPARSE DIRECT MATRIX FACTORIZATION

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/510,911

(22)	Filed:	Feb. 23,	2000
(51)	Int. Cl.7	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	G06F 7/38
(52)	U.S. Cl.		
(58)	Field of		708/446, 607,
		708/160,	200, 490, 520; 710/68; 707/101

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## (57) ABSTRACT

A system that efficiently performs a CMOD operation in solving a system of equations involving a sparse coefficient matrix by identifying supernodes in the sparse matrix. Each supernode comprises a set of contiguous columns having a substantially similar pattern of non-zero elements. The system performs a CMOD operation on each supernode, by determining a structure for the supernode, and computing a function of the structure. The system uses a one-dimensional trapezoidal representation for the supernode during the CMOD operation, if the result of the function is lower than a threshold value, and otherwise uses a two-dimensional rectangular representation for the supernode. The function of the structure of the supernode is a function of a number of computational operations involved in computing a lowertriangular sub-block portion of the supernode and a number of computational operations involved in computing a rectangular sub-block portion of the supernode.

### 18 Claims, 7 Drawing Sheets

